UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/072,971	02/12/2002	John M. Harris	8818.001.00	3501

30827 7590 05/12/2005

MCKENNA LONG & ALDRIDGE LLP
1900 K STREET, NW
WASHINGTON, DC 20006

EXAMINER	
VAN DOREN, BETH	
ART UNIT	**PAPER NUMBER**
3623	

DATE MAILED: 05/12/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/072,971	HARRIS, JOHN M.	
	Examiner	Art Unit	
	Beth Van Doren	3623	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 March 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-14* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-14* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *01 September 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 03/01/2005 has been entered.

2. The following is a non-final office action in response to the request for continued examination received on 03/01/05. Claims 15-16 have been canceled. Claims 1, 2, 4, 5, 7, 9, 11, and 12-14 have been amended. Claims 1-14 are now pending in this application.

Response to Amendment

3. Applicant's cancellation of claims 15-16 overcomes the drawing objections set forth in the previous office action.

4. Applicant's amendments to claims 2 and 5 and cancellation of claims 15-16 are sufficient to overcome the 35 USC § 112, second paragraph, rejections set forth in the previous office action.

Claim Rejections - 35 USC § 101

5. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

6. Claims 1-14 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

The basis of this rejection is set forth in a two-prong test of:

(1) whether the invention is within the technological arts; and

(2) whether the invention produces a useful, concrete, and tangible result.

For a claimed invention to be statutory, the claimed invention must be within the technological arts. Mere ideas in the abstract that do not apply, involve, use, or advance the technological arts fail to promote the "progress of science and the useful arts" (i.e. the physical sciences as opposed to social sciences, for example) and therefore are found to be non-statutory subject matter. For a process claim to pass muster, the recited process must somehow apply, involve, use, or advance the technological arts.

In the present case, claim 1 sets forth a method for determining time intervals for unscheduled demand for components by establishing statistical models for failure rates, collecting historical data, selecting a model, selecting an allowable probability for underestimating an average failure rate, and using a model to calculate a time interval. No technology is used to perform any of the recited steps. Therefore, claim 1 is not within the technological arts because it fails to promote the progress of technology since it can be performed using a pencil and paper or in one's head. Claims 2-6 depend from claim 1 and contain the same deficiencies. Claim 7 is also a method for forecasting unscheduled demand wherein statistical models are established, a model is selected, and a date is determined at which the probability of unscheduled demand reaches a threshold. None of these steps utilize technology, and therefore it is respectfully submitted that claim 7 is not within the technological arts. Claims 8-14 depend from claim 7 and contain the same deficiencies.

Although the claimed invention produces a useful, concrete, and tangible result, since the claimed invention is not within the technological arts, as explained above, claims 1-14 are deemed to be directed towards non-statutory subject matter.

Claim Rejections - 35 USC § 112

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

8. Claims 3, 6, 8, and 10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 3, 6, 8, and 10 present formulas for distribution models. However, in each instance, the terms of these formulas are not distinctly claim and do not have antecedent basis in the claims. For example, claim 8 presents an N-Erlang distribution containing the parameters n, i, j, m, k, t, r, and λ. While specification discloses that m represents month, j represents the type of aircraft, and i represents a component, for example, there is no antecedent basis in claim 8 or in independent claim 7 for any of these terms. Therefore, it is unclear how as to use the equation of claim 8 based on the limitations presented in claim 7. The same is true for each of the equations in claims 3, 6, and 10 and the independent claims on which they depend. Clarification is required.

Claim Objections

9. Claims 1 and 2 are objected to because of the following informalities:

Claim 1 recites "to select models one model of the probability of unscheduled component demand", which should more appropriately be --to select from the plurality of models one model of the probability of unscheduled component demand--. Correction is required.

Claim 2 recites "calculating a time interval when the a probability of the next unscheduled component demand", which should more appropriately be --calculating a time

interval when a probability of the next unscheduled component demand--. Correction is required.

Claim Rejections - 35 USC § 102

10. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

11. Claims 1, 2, 7, 13, and 14 are rejected under 35 U.S.C. 102(e) as being anticipated by Wetzer (U.S. 6,738,748).

As per claim 1, Wetzer teaches a method of determining time intervals at which unscheduled demand for the components is expected to occur, comprising:

establishing a set of statistical models for a probability of unscheduled component demand as a function of at least a failure rate of a component (See column 4, lines 45-65, column 5, lines 33-47, column 6, line 50-column 7, line 20, column 10, line 35-column 11, lines 21, and column 14, lines 49-67, wherein a set of models that manipulate statistics of unscheduled component demands consider the failure rate of the components);

for each component, collecting historical unscheduled component demand data (See column 2, lines 17-28, column 5, lines 30-47, column 8, lines 22-38, column 10, lines 1-30, wherein the performance of the components are monitored, including unscheduled failures);

for each component, using the collected historical unscheduled component demand data to select from the plurality of models one model of the probability of unscheduled component

demand as a function of time (See column 2, lines 17-28, column 5, lines 33-47, column 7, lines 1-20, column 10, line 35-column 11, lines 21 and 30-40, wherein the historical demand is used to predict the probability of unplanned failure of a component as a function of time in the future. The component data is used to select a model that reflects the data. See specifically column 10, lines 37-54);

for each component, selecting an allowable probability of underestimating an average failure rate, α (See column 2, lines 17-28, column 10, lines 1-30 and 40-column 11, lines 21 and 30-40, and column 14, lines 45-67, wherein priorities and reliabilities goals are set with respect to the regular (or average) failure rate per component); and

using the selected model of the probability of unscheduled component demand to calculate the time intervals at which the unscheduled component demand is expected to occur (See column 2, lines 17-28, column 5, lines 33-47, column 7, lines 1-20, column 10, lines 1-30 and 40-column 11, lines 21 and 30-40, and column 14, lines 66-67, wherein the probability predictions of demand are used to determine and schedule for unplanned failure needs).

As per claim 2, Wetzer teaches wherein using the selected model of the probability of unscheduled component demand to calculate the time intervals at which the unscheduled component demand is expected to occur comprises calculating a time interval when a probability of the next unscheduled component demand event equals the probability that the unscheduled component demand will not exceed the allowable probability ($1-\alpha$) (See column 2, lines 17-28, column 10, lines 1-30 and 40-column 11, lines 21 and 30-40, and column 14, lines 45-67, wherein an allowable probability of failure is considered and accounted for in the system. If the

probability of failure is α, then the allowable probability (the probability for which the component will not fail) is $1-\alpha$ as per statistics).

As per claim 7, Wetzer teaches a method of forecasting unscheduled demand for a plurality of different components, comprising:

establishing a set of statistical models for modeling unscheduled demand for the components as a function of a failure rate of each of the components (See column 2, lines 17-28, column 4, lines 45-65, column 6, line 50-column 7, line 20, column 10, line 35-column 11, lines 21, wherein a set of models that consider the statistics of unscheduled component demand as well as failure rates);

for each component, selecting one of the statistical models for a probability of unscheduled component demand (See column 5, lines 33-47, column 7, lines 1-20, column 10, line 35-column 11, lines 21 and 30-40, and column 14, lines 60-67, wherein the historical demand is used to predict the probability of unplanned failure of a component as a function of time in the future); and

for each component, determining a date at which a cumulative probability of unscheduled component demand reaches a predetermined threshold (See column 2, lines 17-28, column 5, lines 33-47, column 7, lines 1-20, column 10, line 35-column 11, line 21, which discusses threshold values for the probability of failure).

As per claim 13, Wetzer teaches wherein the failure rate of the component is a function of hours of operation (See column 4, lines 45-65, column 5, lines 33-47, column 8, lines 22-35, and column 10, lines 1-30, wherein the failure rate is based on the hours a component operates).

As per claim 14, Wetzer teaches wherein the failure rate of the component is a function of flight cycles (See column 4, lines 45-65, column 5, lines 33-47, column 6, lines 55-67, column 8, lines 22-35, and column 10, lines 1-30, wherein the failure rate is based on flight cycles).

Claim Rejections - 35 USC § 103

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

13. Claims 3, 4, 6, and 8-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wetzer (U.S. 6,738,748) in view of Hillier et al. (*Introduction to Operations Research)*.

As per claims 3, 4, and 6, Wetzer teaches modeling for failure rate and unplanned component demand (See column 4, lines 45-65, column 5, lines 33-47, column 6, line 50-column 7, line 20, column 10, lines 1-30 and 40-column 11, lines 21 and 30-40, and column 14, lines 49-67). However, Wetzer does not expressly disclose a Poisson distribution or selecting an equation for λ.

Hillier et al. teaches using the statistical model of a Poisson distribution to project the amount of capacity to provide and predict characteristics of a waiting line for the capacity as well as selecting an equation for λ in the distribution (See pages 661, 663, 672-3, wherein the Poisson distribution is utilized. Lamba represents the mean rate at which the event occurs. Examiner notes that the equation of claim 3 is a Poisson distribution old and well known in mathematics, as shown explicitly on page 672 of Hillier et al.).

The Poisson distribution is a well-known statistical formula used to model the number of events for a specific time period, as discussed by Hillier et al. Wetzer discloses using predictive modeling to forecast demand events (or arrival of unplanned demand) at temporal intervals in the future. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use the Poisson distribution as the model in order to increase revenues by improving a user's ability to accurately plan for unplanned demand events, thus reducing the downtime of equipment that causes the reduced revenue. See column 1, lines 50-65, column 11, lines 1-10, and column 14, lines 40-67, all of which equate better planning to money.

Furthermore, it is well known that a parameter or equation is substituted for lambda when using a Poisson distribution. The claims provide for no specific equation or equations for lambda, just that an equation is selected. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to select a lambda in order to more accurately model the demand-forecasting situation by providing the one parameter needed to complete the Poisson distribution.

As per claims 8 and 9, Wetzer teaches modeling for failure rate and unplanned component demand (See column 4, lines 45-65, column 5, lines 33-47, column 6, line 50-column 7, line 20, column 10, line 35-column 11, line 21, column 14, lines 49-67). However, Wetzer et al. does not expressly disclose using as N-Erlang distribution or selecting an equation for λ.

Hillier et al. discloses using an Erlang distribution to model the expected number of demand events occurring at a time in the furture (See pages 698-700 and 916-7, which discuss using the Erlang distribution in association with queuing theory). However, Hillier et al. does not expressly disclose using the N-Erlang distribution of claim 8.

The Erlang (or N-Erlang) distribution is a well-known statistical distribution used in queuing theory to model the number of events expected to arrive or occur at a specific time period, as discussed by Hillier et al. Wetzer discloses using predictive modeling to forecast demand events (or arrival of unplanned demand) at temporal intervals in the future. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use the claimed N-Erlang distribution as the model in order to increase revenues by improving a user's ability to accurately plan for unplanned demand events, thus reducing the downtime of equipment that causes the reduced revenue. See column 1, lines 50-65, column 11, lines 1-10, and column 14, lines 40-67, all of which equate better planning to money.

Furthermore, it is well known that a parameter or equation is substituted for lambda when using an Erlang distribution. The claims provide for no specific equation or equations for lambda, just that an equation is selected. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to select a lambda in order to more accurately model the demand-forecasting situation by providing the one parameter needed to complete the Erlang distribution.

Claims 10 and 11 recite equivalent limitations to claims 3 and 4, respectively, and are therefore rejected using the same art and rationale set forth above.

14. Claims 5 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wetzer (U.S. 6,738,748).

As per claim 5, Wetzer teaches established models using historical unscheduled demand to predict components needs and failure rates (See column 4, lines 45-65, column 5, lines 33-47,

column 6, line 50-column 7, line 20, column 10, lines 1-30 and 40-column 11, lines 21 and 30-40, and column 14, lines 49-67, which discusses predictive models that manipulate historical statistics for predication of failure and demand). However, Wetzer does not expressly disclose eliminating insignificant variables and variables that cause multicollinearity from each of the established models using historical unscheduled demand.

It is well known in statistics to detect and remove variables that are found to be insignificant or cause multicollinearity in models. The claims do not provide the specific models or variables and provide no specific process or reason for the removal of the variables, just that the removal occurs. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to remove variables that are insignificant and variables that cause multicollinearity in order to decrease the likelihood of errors in the model by removing the variables that statistically cause these errors to occur. This benefit is well known in the art of statistics.

As per claim 12, Wetzer et al. teaches wherein the failure rate of the component is a function of the use of the component and environmental factors related to the component (See column 4, lines 45-65, column 5, lines 33-47, column 6, lines 55-67, column 8, lines 22-35, and column 10, lines 1-30, wherein the failure rate is based on usage). However, Wetzer does not expressly disclose temperature as usage.

Wetzer discloses monitoring the use of components to provide data such as longevity, environmental factors, use profiles, and operating limits, this data indicative of when maintenance and failure of the component will occur. It is old and well known in mechanics that parts have specific temperature ranges in which they are supposed to operate. Therefore, it

would have been obvious to one of ordinary skill in the art at the time of the invention to consider the failure rate as a function of temperature in order to more accurately plan for failure and maintenance, thus reducing the downtime of equipment that causes a reduction in revenue. See column 1, lines 50-65, column 11, lines 1-10, and column 14, lines 40-67, all of which equate better planning to money.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Spence (U.S. 2003/0055715) teaches unplanned demand for parts used in the repair of aircrafts.

Gray et al. (U.S. 2002/0082856) discloses measuring the capacity of a resource according to probability distributions like Erlang and Poisson.

Erke et al. (U.S. 2003/0061126) discloses determining parts demand using failure rates and Poisson distributions.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Beth Van Doren whose telephone number is (571) 272-6737. The examiner can normally be reached on M-F, 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tariq Hafiz can be reached on (571) 272-6729. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

bvd
May 3, 2005

TARIQ R. HAFIZ
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 3600